

A + B = Intubation and Chest Tube  
*Can we make it safer?*

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# Context



# We all say we do it...

## Repeatedly:

- Primary survey
- Skills session
  - Animal labs, mannequin, other simulation
- Exam

Maybe we don't need a refresher.



# So why the gaps in application?

- Infrequent procedures
  - Individual providers
  - Institutional teams
- Safety concerns
- Discomfort



# How do we get comfortable being uncomfortable?

- Preparation/Standardization
- Equipment
- Checklists
- Additional Training
- Telemedicine
- Cognitive Aids





# Case

- 27 year old male
- Head on collision
- Blood in airway
- GCS 7
- SpO2 88% on 15 L NRB

*Time for a plan?*



# Standardization

- Medication boxes
- Protocols/PMGs
- Equipment standardization
- Preassigned jobs
- Trauma Team Practice

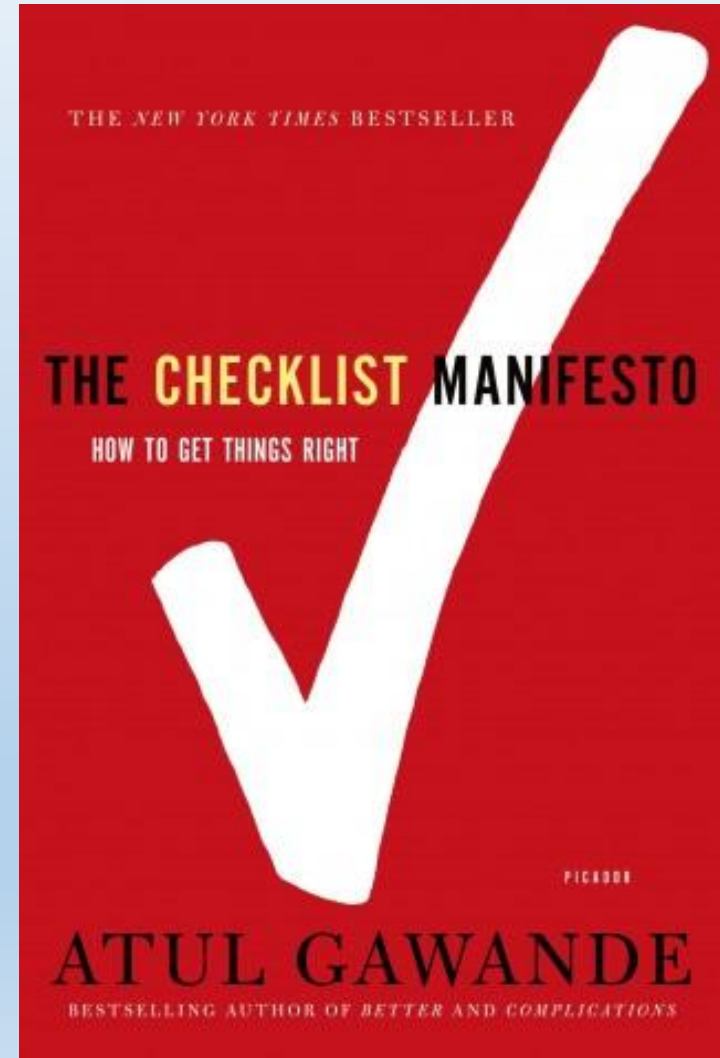
Routine → Safer practices



# Can we make it safer?

## Checklists

- Standardized, team effort
- Routine – do it out loud every time
- Permanently attached to the airway cart





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# A Preprocedural Checklist Improves the Safety of Emergency Department Intubation of Trauma Patients

Kurt A. Smith, MD, Kevin High, RN, MPH, Sean P. Collins, MD, MSc, and Wesley H. Self, MD, MPH

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- Before and after study
- Intubation complications reduced from 9.2% to 1.5%
- Faster paralysis to tube time
- Better safety measure adherence

# Simple and no cost.

**Data Supplement 1.** A standardized pre-procedural checklist for intubating trauma patients.

The checklist has two components: 1) pre-arrival checklist to be completed before the patient arrives in the resuscitation bay, and 2) pre-induction checklist to be completed after the decision to intubate and before rapid sequence intubation medications are administered.

## 1) Pre-Arrival Checklist

**All items must be verbalized by physician responsible for intubation**

1. Oxygen mask and nasal cannula available and connected to oxygen
2. Oral airway available
3. Suction available and running
4. Laryngoscope blade and handle available and functional
5. Tube/stylet available and shaped appropriately
6. Extra tubes and stylet available
7. Bougie available
8. Backup devices available (including laryngeal mask airway, King Airway System, cricothyrotomy kit)
9. Monitors and video laryngoscope screen positioned appropriately
10. Bag-valve mask with ETCO<sub>2</sub> attachment available
11. IV fluid available
12. Individual designated to hold cervical spine stabilization
13. Airway plan verbalized

## 2) Pre-Induction Checklist

**All items must be verbalized by the Nurse Scribe and confirmed by the physician responsible for intubation**

1. Pre-arrival checklist completed
2. Airway plan confirmed between Trauma and ED attending physicians
3. IV line functioning
4. Rapid sequence intubation medication and doses confirmed and drawn up
5. Cervical spine inline stabilization initiated (if necessary)
6. Pre-oxygenation underway with mask at 15 liters/min and nasal cannula at 5 liters/min
7. Patient positioning optimized
8. Blood pressure cuff placed on opposite arm of IV line and pulse oximetry probe

ORIGINAL RESEARCH

Open Access

# A randomised controlled trial of cognitive aids for emergency airway equipment preparation in a Paediatric Emergency Department



Elliot Long<sup>1,2,3\*</sup>, Patrick Fitzpatrick<sup>1,2</sup>, Domenic R. Cincotta<sup>1,2,3</sup>, Joanne Grindlay<sup>1,2,3</sup> and Michael Joseph Barrett<sup>1,2,4</sup>

- Staff, trainees, med students
- Templates and checklists
- Improvements in intubation times with elimination of errors/omissions

# Cognitive aids + Checklists

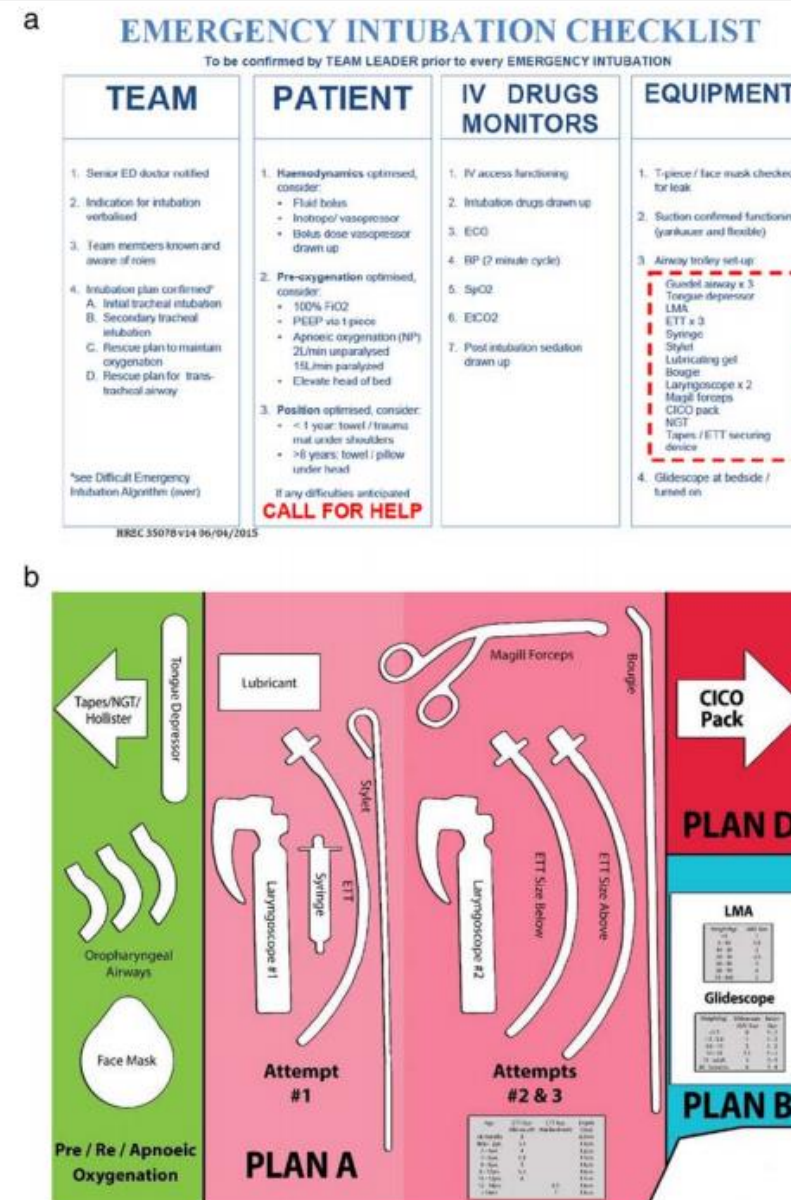
**Table 2** Errors of omission, combined errors of omission and sizing, and time taken for emergency airway preparation by study group

	Errors of omission (%; median (IQR))	<i>p</i> *	Errors of omission and sizing (%; median (IQR))	<i>p</i> *	Time to complete emergency airway preparation (min:sec); median (IQR)	<i>p</i> *
Control	30 (20–40)		35 (30–45)		3:09 (2:38–3:52)	
Checklist	10 (5–10)	<0.05	15 (10–20)	<0.05	3:24 (2:55–4:19)	0.6
Template	10 (5–20)	<0.05	15 (10–30)	<0.05	2:51 (2:28–3:53)	0.14

\**p*-values were calculated by comparing the checklist or template group with the control group

## Conclusion

Standardised airway equipment preparation using a cognitive aid may make emergency intubation a safer procedure. Further studies might examine the impact of standardised preparation on patient-centred outcomes.



**Fig. 1** Cognitive aids used for emergency airway equipment preparation. **a** Checklist (the equipment outlined with the dotted red line on the intubation checklist was tested), **b** Template

# Equipment

## Video Laryngoscopes

Improved success in  
difficult airways

Team participation

Becoming the standard



## LMA

**Laryngeal mask airway as a rescue device for failed endotracheal intubation during scene-to-hospital air transport of combat casualties**

Itai Shavit<sup>a</sup>, Eliad Aviram<sup>b</sup>, Yoav Hoffmann<sup>c,d</sup>, Oded Biton<sup>b</sup> and Elon Glassberg<sup>b,d,e</sup>

**Conclusion** The findings of this study suggest that in the event of failed ETI, combat casualties can be treated effectively with LMA during a short scene-to-hospital transport time. *European Journal of Emergency Medicine* 25:368–371 Copyright © 2018 Wolters Kluwer Health, Inc. All rights reserved.

*European Journal of Emergency Medicine* 2018, 25:368–371



# Case: Now he's intubated

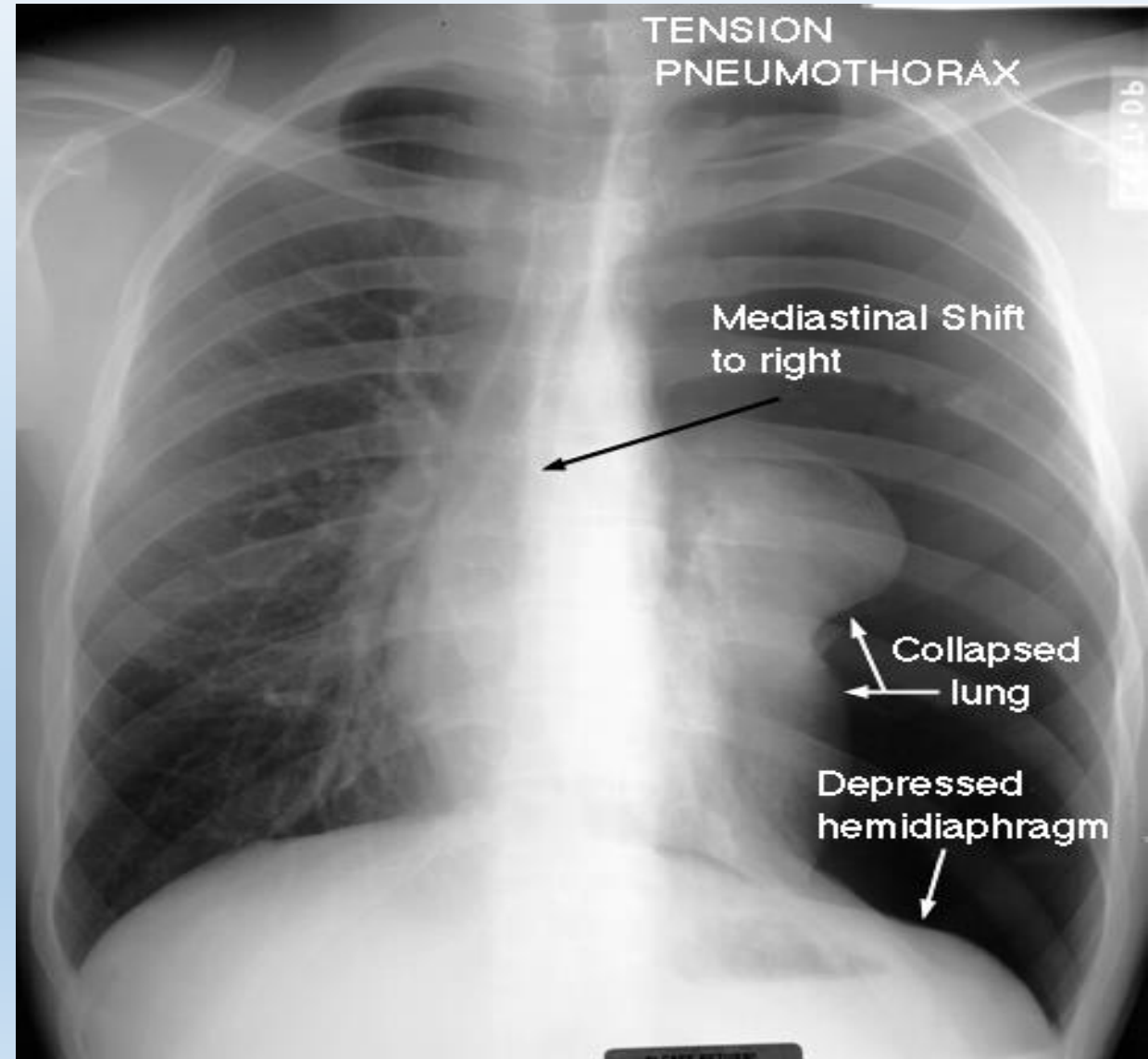
**27 year old male MVC**

- Following successful intubation, the patient now develops hypotension, SQ emphysema, and has absent breath sounds on the left.

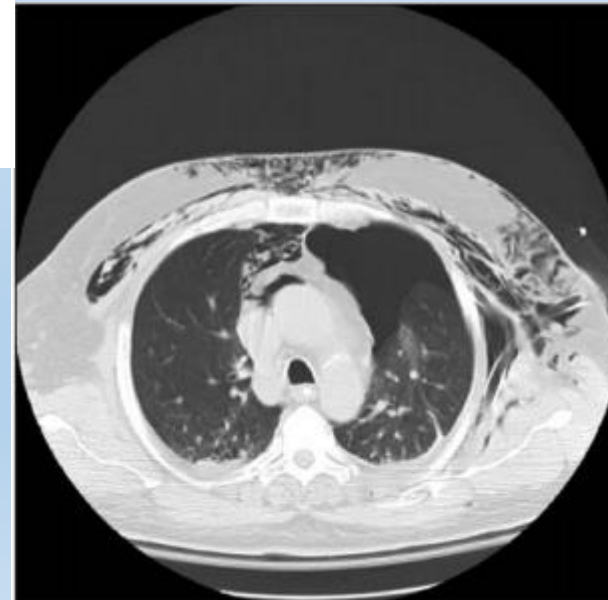


# Chest trauma

- 25% of trauma deaths are due to thoracic injuries
- Most thoracic injuries requiring intervention are treated with a chest tube
- Tension pneumothorax:
  - Requires timely intervention
  - Clinical diagnosis



# Chest tube training gaps



## Chest tube complications: How well are we training our residents?

*Chad G. Ball, MD;<sup>\*</sup> Jason Lord, MD;<sup>†‡</sup> Kevin B. Laupland, MD;<sup>†</sup> Scott Gmora, MD;<sup>\*</sup>  
Robert H. Mulloy, MD;<sup>\*§</sup> Alex K. Ng, MD;<sup>¶</sup> Colin Schieman, MD;<sup>\*</sup> Andrew W. Kirkpatrick, MD<sup>\*†§</sup>*

*Can J Surg, Vol. 50, No. 6, December 2007*

# How do we make it safer?

- Telemedicine
- Additional training
  - Skills labs
  - Mobile sim units
  - Direct mentorship
- Transport team availability
  - Flight nurses and medics are trained and validated regularly



# Cognitive tools

## RCT 128 trainees

- 69% had no live experience
- Improvements in objective safety technique with brief video on a tablet/mobile device

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Association for Academic Surgery

### **Use of mobile learning module improves skills in chest tube insertion**★

*James S. Davis, MD, George D. Garcia, MD, Mary M. Wyckoff, PhD, Salman Alsafran, MD, Jill M. Graygo, MA, MPH, Kelly F. Withum, BS, and Carl I. Schulman, MD, PhD, MSPH\**

*University of Miami Leonard M. Miller School of Medicine, Department of Surgery, Miami, Florida*

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JOURNAL OF SURGICAL RESEARCH 177 (2012) 21–26



# Cognitive tools

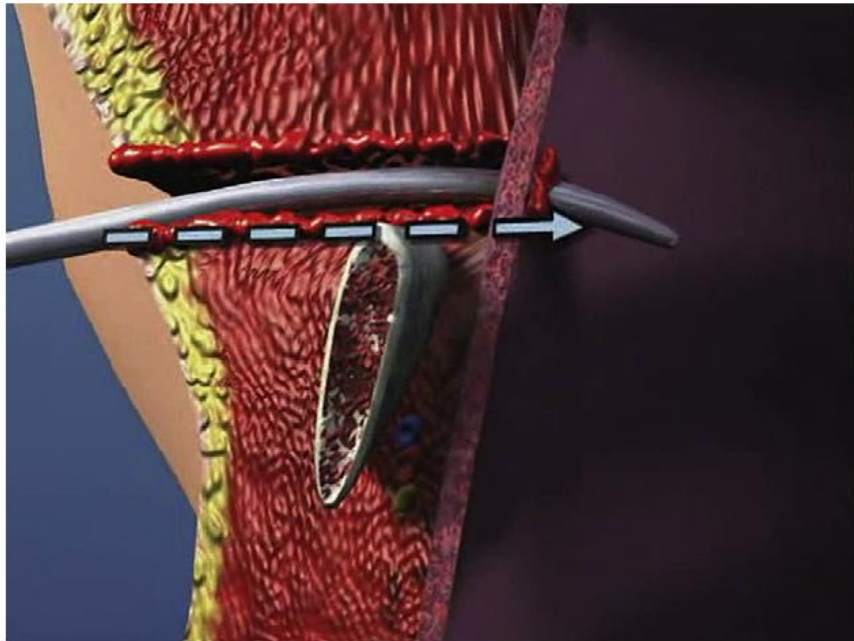


Fig. 1 – Screen shot of the chest tube mobile learning module.

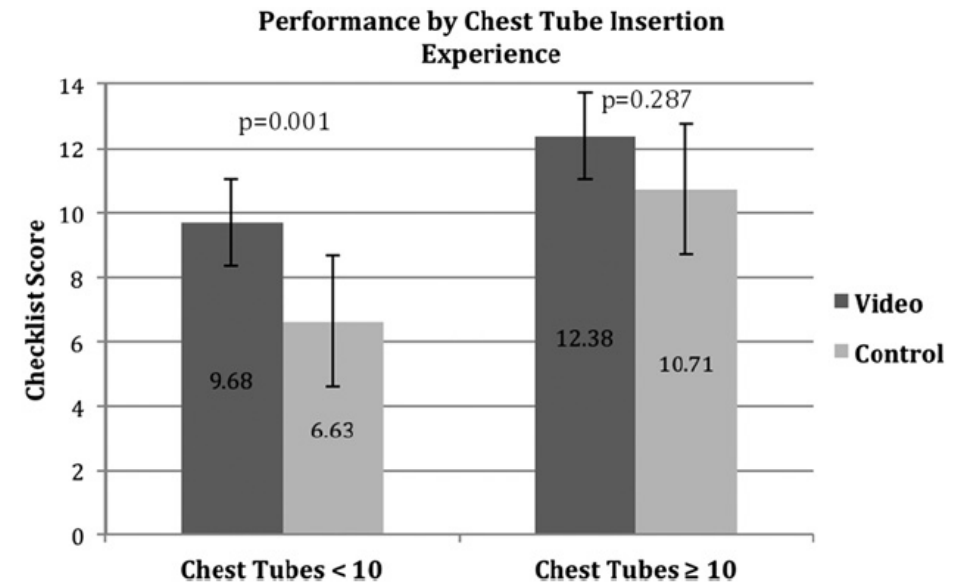


Fig. 5 – Chest tube insertion scores as stratified by experience placing chest tubes on human patients (includes all subjects).

# Future Directions

- Outreach:
  - Checklists
  - Medication cards/dosing
  - Videos and other cognitive tools
- Simulation and more standardized training
- Education: RTTDC, ATLS
- Facility driven standardization
  - Provider variance
  - Equipment



# Questions?

